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INDEX TO ADVERTISEMENTS

In the "Canadian Architect and Builder."

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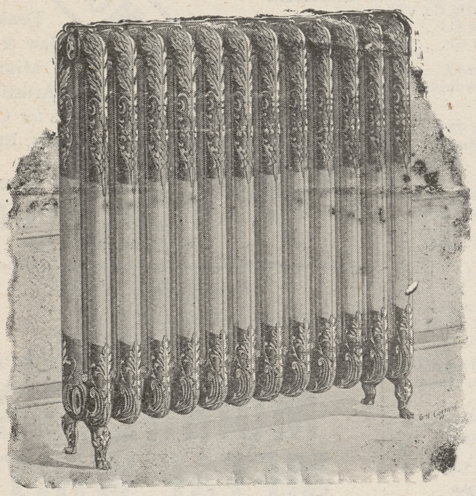

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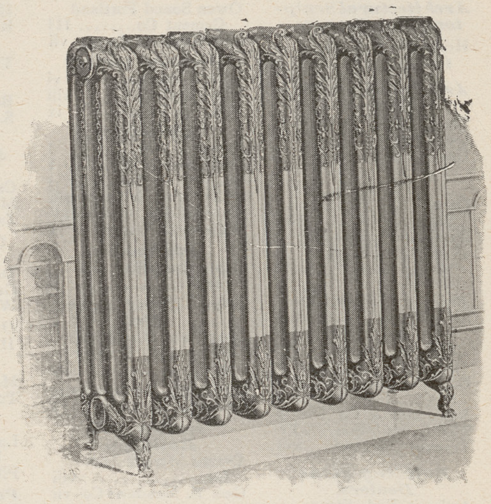

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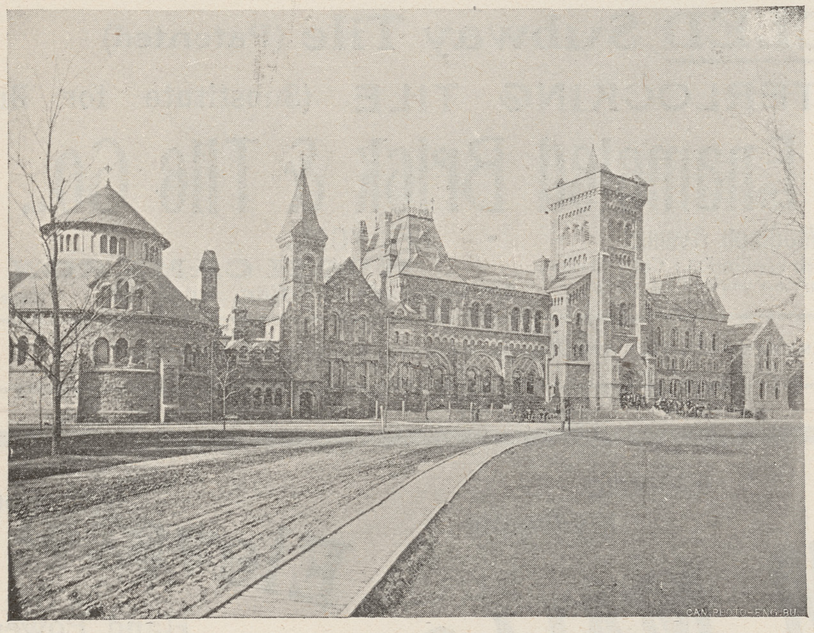

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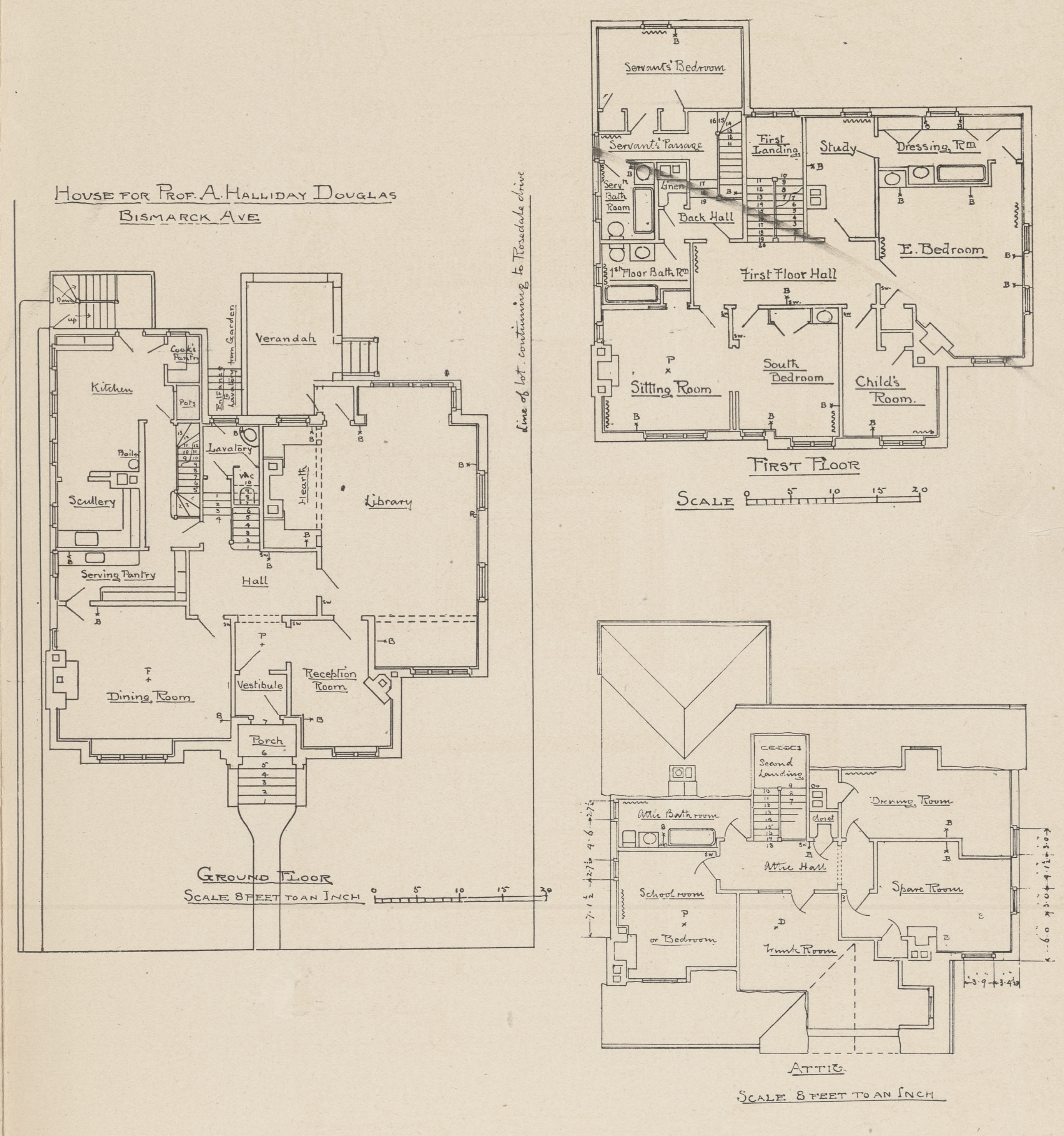

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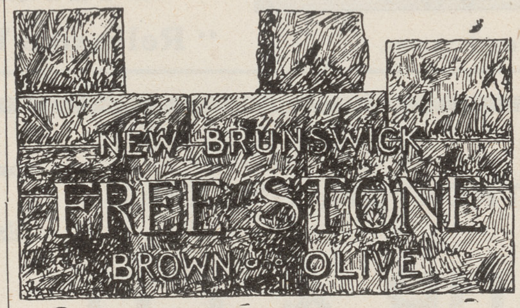

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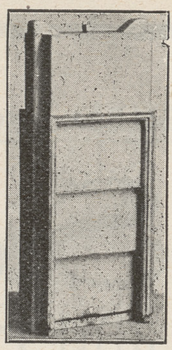

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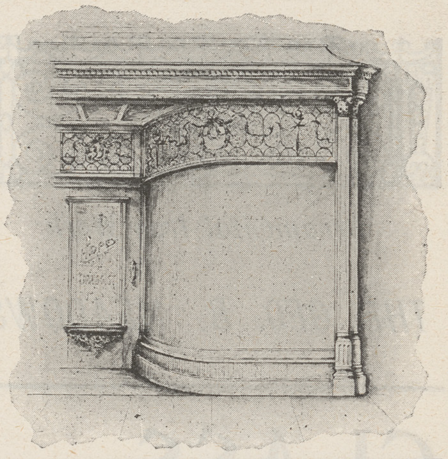

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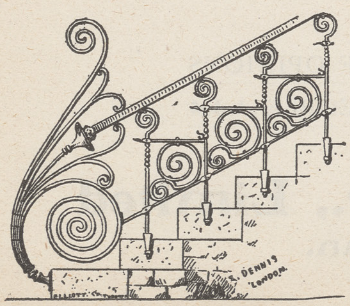

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The Canadian Architect and Builder

VOL. XV.—NO. 176. AUGUST, 1902.

ILLUSTRATIONS ON SHEETS.

House on Bismarck Avenue, Toronto.—W. A. Langton, Architect.

ILLUSTRATIONS IN TEXT.

Canadian Pavilion, Wolverhampton Exhibition of Arts and Industries.

ADDITIONAL ILLUSTRATIONS IN ARCHITECTS' EDITION.

Photogravure Plate—St. James Square Presbyterian Church, Toronto.—Smith & Gemmell, Architects.
Photogravure Plate—Store Front, King Street West, Toronto.—Smith & Gemmell, Architects.
Apartment House, Montreal.—Macvicar & Heriot, Architects.

CONTENTS

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" S. H. TOWNSEND, " "
" FREDERICK G. TODD, Landscape Architect, Montreal.
" W. H. ELLIOTT, Toronto.
" J. C. B. HORWOOD, Architect, Toronto.
" A. F. DUNLOP, R.C.A., Architect, Montreal.

Cement Blocks. THE new Dairy Building for the Toronto Industrial Exhibition is well worth examination by architects as an exhibit of cement block walking. It gives the Dairy Building a good architectoric appearance, and suggest the attainment of a characteristic effect, for at any rate plain work. It is rather questionable whether the right result is being attained by casting the blocks in imitation of rock faced stone; but it is remarkable how little the similarity of the blocks, which are of course all cast with the same face, catches the eye. Experience, however, teaches that this treatment will weary in time, if it does not at first. It ought to be possible to give a surface to the blocks, if that is needed, without trying to make them look like stone. If one may judge from the smooth portions of the work—the pilasters, etc., at the entrances—the edges of the blocks are what need most treatment, and attention would be well devoted to the joint.

Municipal Bungling. WHILE the newspapers are continually urging the advantages of municipal management of public utilities and depicting private contractors in the light of robbers of the privileges and hard-earned dollars, of the citizens, the cold facts do not bear out their assertions. On the contrary, it is the case, in Toronto, at least, that every public undertaking placed directly under the control of the Council in recent years has been badly bungled and has resulted in loss of the public funds. The latest example is to be found in the new Exhibition Buildings. The contract for the structural steel work for the Main Building was awarded last February to the Canada Foundry Company, whose tender was the lowest. The Council was subsequently prevailed on to call for new tenders, which resulted in considerable loss of time. The Canada Foundry Company's tender again proved to be the lowest and was accepted. A further delay ensued while the Council listened to deputations from the Unions who wanted changes made in the specifications on which the tenders were based. This the contractors rightly refused to permit. Then changes were made in the drawings, necessitating the re-cutting of some of the structural material. As a result of these causes, two months of valuable time were frittered away, and the contractors were compelled to notify the Council that because of the delay, for which they were in no way responsible, the building could not be completed within the specified time and would not be available for this year's Exhibition. The St. Lawrence Market Building is another such example of municipal bungling. The citizens have to a large extent lost confi-

dence in municipal management of any enterprise larger than a peanut stand, and will be very slow indeed to vote for any further projects involving large expenditures under the direction of the City Council. Municipal management is perhaps beautiful as a theory, but in the light of practical experience, it must rank as a dismal failure.

The Flat Iron Building.

It is quite possible to get tired of seeing pictures of New York's Flat Iron Building, which represent it as about 10 feet through and twenty stories high. The plain fact is that this is an illusion, a representation from a trick point of view. The building is at the junction of two streets which meet at an acute angle. It has therefore converging sides, and as the point of convergence is rounded the ground plan is like a flat iron. It is in the rounded end that the interest lies for sensational picture makers. As every foot, in such a site in New York, is precious, the end is carried out to as small a round as is at all serviceable inside, and this, for the height of the building, is pretty sharp. Now, if the spectator takes up a position where he just loses sight of one side, he seems to be looking at a building which is of the size of the side in view and only as thick through as the rounded end. It all lies in the plainness of the round and in this point of view. It is just like American journalism—which regards facts only as something to be rummaged for possibilities of startling copy—to always represent the building thus, without a word. The illusion is interesting, but why not explain that it is an illusion? Something like the following would do, "This building, though in plan like a flat iron, can, by choosing a judicious point of view, be made to look like a washboard. See our illustration."

Toronto Island Park.

The latest intelligence about the Island improvements that are going to make Toronto the Venice of America, the Mecca of summer pilgrims, the convention city, is that the Park Commissioner is to take a little run of a fortnight to see what he can see and when he comes back he will settle the matter. By all means let Mr. Chambers go for a trip. He probably works hard and deserves a change. He may perhaps learn by travel what a park is like, and stop spoiling the sweeps of the Queen's Park and High Park by dotting them with his little, spikey evergreens. But what nonsense it is to talk of his taking a little trip and coming back prepared to design a park and lagoons for the island! The suggestion is his own. He accounts for his failure to produce the plan he undertook some months ago to make, by saying that he must go away first to see other places. It is a fatal error to suppose that the assembling together of ideas picked up in different places is a plan. The assemblage remains a mere assemblage even if the ideas are suitable, which they are not likely to be. At the best it is a bric-a-brac park; at the worst it is a hodge podge. What we want is a design; something that has character throughout; something that has lines; something that lies in masses; a park of which the details seem to suit itself, and do not remind one of something else. Is Mr. Chambers likely to learn to plan such a landscape by running round the parks of the United States for one breathless fortnight? Let us get down to business, by employing somebody to design who can design; and let Mr. Chambers keep in order what is designed. That is his proper business.

The Toronto Exhibition Buildings.

Now that the new exhibition buildings are in place, it is evident that they are not in the right place. The art gallery and the dairy building lie, with reference to one another, in a manner that can only be described as higgledy piggledy; and the dairy building is so placed as to cut into the axial avenue which, in the plan of the Toronto Chapter of the Ontario Association of Architects, it was shown to face. This plan was accepted and filed. It was ingeniously laid out so that the new buildings would both face the present winding roads conveniently, and yet be found properly placed, when the time comes that there is somebody in charge with larger ideas, and the avenues are widened and made more stately. The plan has been inaccurately carried out, and every deviation is an injury to the grounds. The worst offence has been in moving the main building west, far enough to set it hard upon the edge of the future main avenue. Of course the road will now have to deflect so that the building may be properly set back from it. This means that there will be no view of the lake down that avenue, as was intended, and as there ought to be.

However, the main building is wrongly placed in any case. It is easy to see now, after the walls are up, that it is out of place altogether where it is. To place a building 350 feet long so as to block, for half the Fair, the look out to the lake, which is the feature of the site, is a fundamental error. It ought to be where the old main building and the horticultural building now stand. Query: As the new building is mostly iron roof, how would it pay to take it down when the old building is condemned with its final condemnation, and put it up again where the old building stood? A better plan would be to stop the new building where it stands—the walls about complete but no roof yet on the ground—and when the Fair is over for this year make a fresh start, by pulling down the old main building and the horticultural building and moving the new main building to their site. This may sound outrageous, but in the end the $15,000 that it will cost will be well expended. The building will be put where it can be left; and, in any case, a proper arrangement of the grounds is worth more than $15,000 to the city. The question of the Fair grounds is really a serious question for Toronto, and this foolish city hall officialism which makes it impossible to get anything done properly is such a costly game that meditation naturally turns to reflect upon the comparative economy of a staff of first class, well paid, permanent officials. But how are we going to get *that* done?

The Fallen Campanile.

Evidence as to the cause of the fall of the Campanile of San Marco is accumulating and all the evidence points in the direction of a spreading strain upon the walls at the bottom. It is difficult to image how, from any other cause, the tower could collapse vertically as it did. It came down as a tall chimney that is felled by the simultaneous destruction of underpinning all round.

Howard Walker the American architect was an eye witness, from some distance, of its fall and describes the angel at the apex—the feature of the structure that ultimately lay the farthest from the site—"slowly descend, swaying, but upright"; and members of his family, who were close to the tower, told him that "spurts of lime-dust puffed from the tower about 20 feet up from the ground and that then . . . the base of the tower spread "like the roots of a tree?"

Another witness is an architect who writes to The Builder giving a measured plan of the Campanile which he made 27 years ago. The gist of his observations is that the inner and outer shells, between which runs the sloping ascent vaulted in brick, were tied together by wooden bond timbers some of which were decayed. "In many cases" the timbers were cut out, he supposes on account of decay, and had not been renewed. He noticed "several serious cracks in the structure", which he "attributed to the decay of the bond timbers".

Further evidence is given by the ruins themselves which show:—first, that "large numbers" of the bricks were old bricks—Roman bricks, stamped with a stamp which identifies them as coming from Altinum, a city which was ancient when Venice was new—; and, secondly, that the walls were badly built, in some cases being mere shells,(those jerry building ancients again!) filled in with rubbish.

When one thinks of an inclined plane of brick 3 feet 9 inches wide and 875 feet long (by this English architect's plan) resting its accumulated weight at the bottom upon walls which were badly built of bricks which had already served their term a thousand years ago; which have been suffered to decay behind the concealment of a marble loggia and have been deprived by decay and careless cutting of their wooden vaulting tie; it is no wonder that the base of the tower spread "like the roots of a tree."

THE R. I. B. A. COLONIAL EXAMINATIONS A CHANCE FOR ARCHITECTS.

There is seldom anyone who has had a liberal education who does not later in life wish that he had the chance again, knowing what he now knows of what kind of study would be the best for him to pursue. If it were possible for men to take up their calling for some years before finishing their education there is no doubt that the finishing process would be done more intelligently and with greater interest and profit. Architects of all men find that practice opens their eyes not only to new fields of study but to the need of more careful study of what they have already learnt. In particular is it true that increasing experience inclines them continually to the study of the academic examples. Whereas in their younger days they were apt to think a general acquaintance with the historical styles was all that was desirable for this country, and that more intimate study was better expended on current examples; as they increase in experience, it is current work that receives only general attention and they long, generally in vain, for time and opportunity to study old work even out of books. It is not impossible, even in the midst of practice, to pursue these studies to some effect, but it would require much energy and more method to accomplish anything systematic. A day's work does not create an appetite for evening studies, and without a definite end within sight there is little chance but what these studies will be indefinitely postponed. With something to fix a limit both in time and in extent it is easier to begin and to keep going. Here then is a use for the Colonial Examination of the Royal Institute of British architects.

The examinations consist of two days given to a sketch design; it was an almshouse in the examination of this year. After this there are papers on the following subjects :

1. The Nature and Property of Building Materials ; their decay, preservation and quality, and their application in building.

2. The Arrangement and Construction of Buildings, in relation to health, drainage, water supply, ventilation, lighting and heating.

3. Specifications and Estimating. A specification of the work in various trades. The measurement and cost of building work. The conditions for building contracts.

4. Construction. Foundations, walls, retaining walls, arches, vaults, floors, roofs, etc., and constructive details in all trades.

5. Construction. Construction in iron and steel. Showing underpinning and dealing with ruinous and dangerous structures.

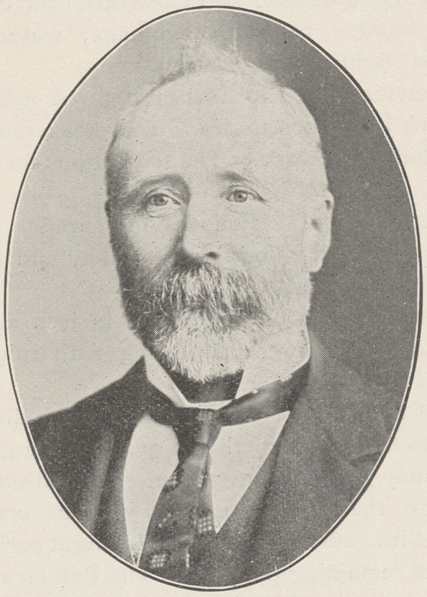
None of these papers would afford much difficulty to an architect. Any practising architect ought to be able, we may gather from these examination papers, to go into the examination hall without preparation and pass with sufficient credit. He might perhaps also pass in the remaining paper—6. The Principal Styles of Architecture : their features, mouldings, and ornament, so that if the right to put A.R.I.B.A. after his name is all he wants the only thing that need stand in his way is the five days' effort necessary and the six guinea fee.

But this paper upon the architectural styles is worth more to Canadian architects than to be merely an instrument for acquiring letters. It makes the very motive that is wanted to stimulate to continuous application in the study of historical work. The ultimate goal—freedom of design—is not less surely attained if the attention is fixed for a time upon the examination as an intermediate object. The examination, like a half way house, will make the way seem shorter. But its prime use lies in its supplying a fixed line of study and a fixed time for its accomplishment. These are a great help to a lonely student.

If the loneliness could be got over a greater difficulty still would be removed. Association is always a help to students, and will be particularly so to the architect student who has other work to do and to whom it is desirable that this course of study should present as much as possible the appearance of recreation. Why should it not be made something of the nature of recreation, by a number of architects agreeing together to take the examination and meeting together once a week or so to talk over and analyze the characteristics of the styles? Both the Ontario Association of Architects and the Province of Quebec Association have attractive rooms, with conveniences for associated work, and, examination or no examination, this is the sort of work to do there.

There is more reason for meetings of this kind than

merely to give to solitary work the pleasure of society. Association in study both broadens and quickens apprehension. "Iron sharpeneth iron; so a man sharpeneth the countenance of his friend." Several pairs of eyes means several points of view, and united research and united criticism will get to the practical essence of the matter more quickly than solitary study. Moreover it is remarkable how much easier it is to remember what has been enjoyed in common than what has been enjoyed alone. The person who, in reading Shakespeare for the first time, observed that he indulged largely in quotation, would never have been so familiar with these passages if he had read them first for himself. One may read



MR. A. McDONALD,
President Winnipeg Master Carpenters' and Builders' Exchange.

and enjoy without remembering; the thing to fix a passage in the mind forever is its application by some one else to point an idea. Common study will contribute in this way to a common stock of knowledge that is clearer, more vivid and more practical than any member of the body could attain to alone. There is likely to be noticeable results in the way of vigorous design proceed from such a group of associated artists.

It is as artists that architects will meet one another in such a field of work as this, and it seems to be a law that capacity in the individual artist develops only by association. Solitude may nurse reflection, but art is execution and needs contact with the effort of others. The best work in art has always originated from a group of artists. The diverse results in individuals of a group show that association does not weaken character. Artists cannot suck one another's brains. Each man's ideas must grow in their own way, but they grow best in an atmosphere where thought is free. If a school of architecture, however local, could grow from united effort in study, so much the better. We suffer for want of unity; from the dissipation of effect that comes from individualism; and if by any possible means we could attain to such agreement of type in any town that excellence in a building would consist not in being different from its neighbours but only in being more excellent, we should have a town that would have architecture, no matter what the type.

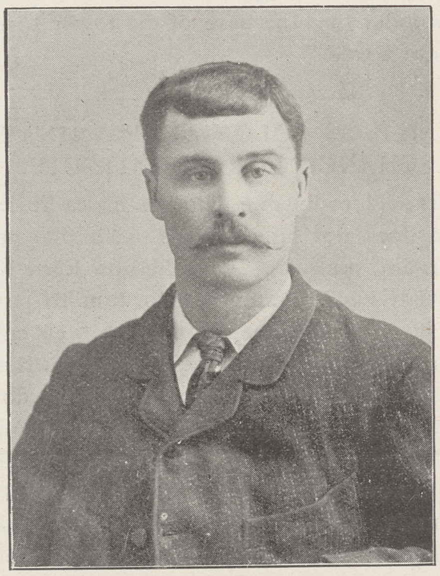
This is looking a little onward from the R.I.B.A. examination, but study of originals and associated effort are two things which are apt to go far in results.

SOUTH AFRICAN TRADE.

With the ending of the war in South Africa will come a period of great development in that country and a consequent demand for many lines of manufactured goods. German and Austrian syndicates are said to be forming to exploit the South African market. With cool audacity the continental countries which indirectly supported the Boer cause and obstructed the British, are now seeking to reap the commercial advantages arising out of the conditions established by Great Britain at an enormous cost in men and money. The United States have also been exporting largely to South Africa, and their trade returns for the first half of this year show a substantial increase above the same period of 1901. It seems only fair to her own interests that Great Britain should impose some restrictions in the form of duties on foreign goods entering the South African market, thereby giving a preference to home and colonial industries, which will have to bear a considerable portion of the expenses of the war, and compelling foreign countries to contribute something for the commercial advantages which are the direct result of the long continued and successful struggle conducted by Great Britain. Canadian exporters of manufactured goods should lose no time in establishing trade connections in South Africa, and should be properly represented at the South Africa, British and Colonial Industrial Exhibition to be held in Cape Town from November to February, 1903-4.

Building materials, especially bricks, lumber, doors and sashes, and structural iron and steel are in large demand. The United States have already secured some valuable orders in this line. The establishment by the Dominion Government of a direct freight service between Canada and several of the principal South African ports is a gratifying assurance that this country proposes to secure its share of this trade.

Most of the business must be done through importing agents. Lists of these in the principal towns should be secured, personal letters addressed to them acquainting them thoroughly with the character of the goods to be offered. Exporters should also be prepared



MR. A. McCORMICK,
Secretary Winnipeg Master Carpenters' and Builders' Exchange.

to send samples and submit tests of their materials, as in many instances these will be demanded. Care should be taken to ascertain the financial responsibility of all firms with whom correspondence is opened, before sending goods forward, especially in the case of commission firms among whom there are many "sharks," who make their living out of "consignments". The principal demand is for goods of medium quality and moderate price. Whatever the quality of goods for which orders are secured care should be taken by the exporters to maintain uniformity, otherwise they may not expect to hold the trade.

INTERCOMMUNICATION.

[Communications sent to this department must be addressed to the editor with the name and address of the sender attached not necessarily for publication. The editor does not hold himself responsible for the expressions or opinions of correspondents, but will, nevertheless, endeavor to secure correct replies to queries sent in. We do not guarantee answers to all queries neither do we undertake to answer questions in issue following their appearance.]

OUR INFORMATION BUREAU.

It is gratifying to notice the steadily increasing interest which is being manifested by our readers in the "Intercommunication Department." Requests for information on constructional problems such as constantly confront the builder are coming to us with more frequency and from an ever widening circle of engineers. Thus the Department is fulfilling to a much greater extent than when first established its purpose as a medium for the exchange of experiences and ideas. Still its usefulness and value might be further enhanced to an almost unlimited degree if every reader who requires or has information to impart would become a regular contributor. Will those who read this paragraph make a point of writing the editor of our Intercommunication Department for a solution of the very first difficulty which meets them and which they do not know quite how to tackle? He will be delighted to try to help them out. Bear in mind also that you ought fairly to help out the other fellow by sending in an answer to his questions in cases where you happen to possess the information he is looking for.

From "Carpenter".—I have been engaged to erect a "grand stand" on our Fair grounds, the stand to have eight seats and would like to get a little information, with a design, as to the best method of building same, so as to make it strong and secure. It is to be 80 feet in length.

Ans:—The design shown herewith, (Fig. 1.) will serve your purpose. It is strong, well designed, and if

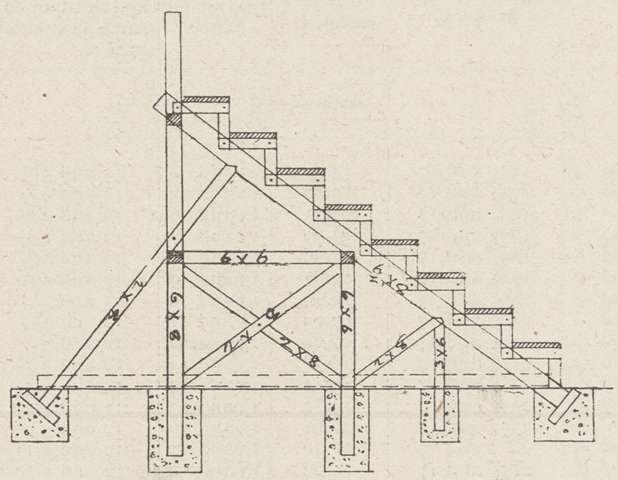


FIG. 1.—DESIGN FOR GRAND STAND.

made of Norway pine, will last for many years. The posts, stringers and back braces, may be set in concrete as shown, or, where this is considered too expensive the posts might be set in barrells filled with gravel, and gravel may be used for the feet of the braces. If it is to sit on the ground, the posts and braces may be framed in a bearing sill which is shown by the dotted lines on the ground line. The cross braces may be made of 2" x 8" stuff, the balance being all timber except the seats and risers which are made of plank. Bearing strings to be about 8 ft. apart. This structure should be well spiked together.

From "Winnipeg".—Having a brick building to put up, with walls only nine inches thick which are to be rendered and strapped inside, the windows to have shutters on outside; sashes to be double hung; I am somewhat in a quandry as to the best method of making the window frames for same, as the walls are so thin. Could you publish an illustration showing horizontal section of a frame that will suit this case? I am sure it will be of interest to others as well as myself.

Ans:—We show in Fig. 2, a section of a window frame that is made use of in just such positions as our correspondent describes. This shows stone or cement

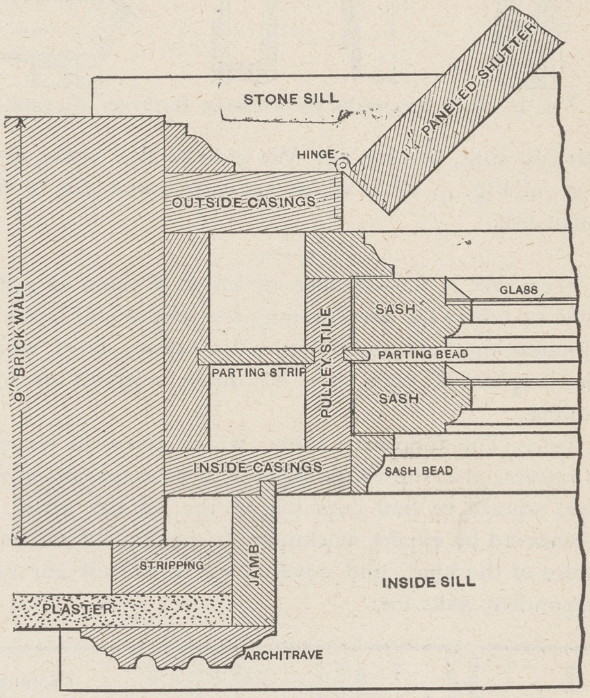


FIG. 2.—SHOWING SECTION OF WINDOW FRAME.

sill on outside, and window stool or sill on inside. It is drawn to scale and the dimensions of each member may be taken from the diagram.

From W. P.—What is the best material to use in laying a damp course? Also, what width of concrete footings should be laid in loam ground to carry a three-storey brick-building, the two lower stories to have walls 14 inches thick, and the third storey walls 9 inches thick? Answers to these questions will be appreciated.

Ans:—The sketch shown at Fig. 3, covers the ques-

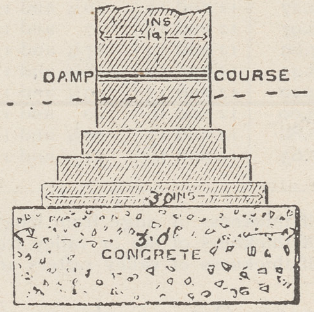


FIG. 3.—SECTION OF WALL.

tions asked, the depth and width of concrete being shown. The damp course is placed just above the ground grade which is shown by the dotted line. This course should be composed of two courses of slate laid in Portland cement, the joints of the top course overlapping the lower course. Sometimes a layer of asphalt is used for a damp course, but it is not as good

as slate, neither is Portland cement alone, which is sometimes used.

From Joe B.—Will you kindly publish a design or two for shingle belting courses and oblige?

Ans:—"Joe B.", does not say what style of shingle

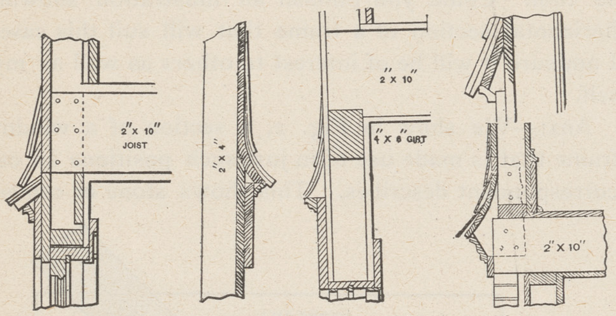


FIG. 4.—FIVE EXAMPLES OF SHINGLE BETTING COURSES.

belt coursing, he requ'res We publish five styles however, at Fig. 4, all of which are simple and are in frequent use.

From W. J. S.—Wishes to know if there is not a table or tables for ascertaining the length and levels of common hip, jack and octagon hip rafters, from which the lengths of each can be taken without further trouble.

Ans:—The following table, which gives the lengths of rafters, also shows the figures to be employed in the steel square to find cuts for all the pitches given, is considered by expert workmen, to be one of the best tables of the kind, and covers, we think, all our correspondent asks for:

color, the hardness and clean outlines of the bricks. If you could send us specimens we would be in a better position to advise you.

S. S. C. writes: Will you please give me such information as you think necessary to answer the following: There are two stores 70 feet long, 22 feet wide with a brick wall between running up through the other story which is 12 feet high, and out through the roof a distance of four feet to serve as a fire wall. Above this wall 13', or a brick and a half thick I want to throw the two stores into one by taking out this wall the height of the first store. What is the best way to support wall above and carry ends of joists which rest on wall? If steel beams are best how large would they require to be to carry that amount of wall alone and rest ends of beams on wall at ends with two iron columns in centre.

Ans.: In reply to your questions, we may say that there are no great difficulties in the way of taking out wall between stores. Cut holes through wall on second floor about 8 or ten feet apart, insert timbers 10" x 10", 6 or 8 feet long. Shore them well up from the foundations or ground below, and wedge up to brickwork snug and tight. Support joists from floor below by stringers and studding. When all is driven in tight, remove a part of the brickwork and introduce girders from wall to first post. Then build in girder up to brickwork, making all as solid as possible. Proceed in the same manner with the next portion between the two posts and when finished complete the last portion. Girder will show in the stores, and joists must

Rise of roof per foot run.	Length of common and jack rafters per foot run.	Top and bottom cuts of common and jack rafters	Side cut of jack rafters. Same figures cut hip and valley shingles, and reversed will cut planceer and roof sheeting.	Rectangular hip and valley rafters			Octagon hip rafters.		
				Length per foot run of common rafter.	Cuts.	Side cut against ridge or deck.	Length per foot run of common rafter.	Top and bottom cuts of hip rafter.	Side cut of jack rafter against octagon hip. Top and bottom cuts same as common rafters.
Inches.	Inches	Foot. Top.	Cut.	Inches	Foot. Top.	Cut.	Inches.	Foot. Top.	Cut.
4	12.64	12 and 4	12⅝ and 12	17.46	17 and 4	17½ and 17	13.60	13 and 4	12 and $4\frac{10}{12}$
5	13.00	12 and 5	13 and 12	17.72	17 and 5	17¾ and 17	13.92	13 and 5	12 and $4\frac{8}{12}$
6	13.41	12 and 6	13⅜ and 12	18.02	17 and 6	18 and 17	14.31	13 and 6	12 and $4\frac{6}{12}$
7	13.89	12 and 7	13⅞ and 12	18.38	17 and 7	18⅜ and 17	14.76	13 and 7	12 and $4\frac{4}{12}$
8	14.42	12 and 8	14⅜ and 12	18.78	17 and 8	18¾ and 17	15.26	13 and 8	12 and $4\frac{2}{12}$
9	15.00	12 and 9	15 and 12	19.23	17 and 9	19¼ and 17	15.81	13 and 9	12 and 4.0
10	15.62	12 and 10	15⅝ and 12	19.72	17 and 10	19¾ and 17	16.40	13 and 10	12 and $3\frac{10}{12}$
11	16.27	12 and 11	16¼ and 12	20.24	17 and 11	20¼ and 17	17.02	13 and 11	12 and $3\frac{9}{12}$
12	16.97	12 and 12	17 and 12	20.80	17 and 12	20¾ and 17	17.69	13 and 12	12 and $3\frac{7}{12}$
13	17.69	12 and 13	17¾ and 12	21.40	17 and 13	21⅜ and 17	18.38	13 and 13	12 and 3 5-12
14	18.43	12 and 14	18⅜ and 12	22.02	17 and 14	22 and 17	19.10	13 and 14	12 and 3 3-12
15	19.20	12 and 15	19¼ and 12	22.67	17 and 15	22⅝ and 17	19.84	13 and 15	12 and 3 2-12
16	20.00	12 and 16	20 and 12	23.34	17 and 16	23⅜ and 17	20.61	13 and 16	12 and 3.0
17	20.80	12 and 17	20¾ and 12	24.04	17 and 17	24 and 17	21.40	13 and 17	12 and 2 11-12
18	21.63	12 and 18	21⅝ and 12	24.75	17 and 18	24¾ and 17	22.02	13 and 18	12 and 2 10-12

Deduct half thickness of ridge from length of hip, valley and common rafters.
Deduct half thickness of hip or valley from length of jack rafters.
Deduct half thickness of valley rafters and ridge from length of cripples.

H. G., Hanover, Ont.: Could you give me any idea as to the value of a recipe for making fire brick that will stand the attack of alkalies and great heat as well as any other, if it can be made from a waste product in Ontario.

Ans.: If bricks that will resist alkalies and stand great heat can be made at a reasonable price, there will probably be no difficulty in creating a fair demand for them. Something will depend, however, on the

rest on girders. Use steel girders or beams 12 inches deep with double flanges. You will require two running the whole length, placed side by side. Cast iron post should not be less than 6 inches in diameter, and should be provided with suitable caps, and rest on a solid stone base. Leave shoring in place for a few days after the work is bricked up, then remove and fill in holes in wall where 10 x 10 inch timbers went through.

From W. B.—Would it be safe to take away a central pier from under a lintel having a span of 8 ft.—the stone being a free-stone $8\frac{1}{2}$x8 inches, with two stories of brickwork above it?

Ans.—Something would depend on the thickness of the brick wall, a condition you have not given us, but, under any circumstances, it would not only not be safe, but dangerous to remove the pier without first supporting the wall above. First needle and shore the wall above the lintel, and fully support the wall above; then insert a relieving arch of proper thickness and laid in cement; or put in two steel beams, not less than 8 inches deep, separated apart equal to the thickness of the wall. Wedge up tight with slate and cement mortar, and then take out the pier. This is the proper way to do work of this kind. Never subject a stone or brick lintel to a sudden strain, or you will surely have an accident. It is no trick to support a brick wall by shoring and needling.

THE WASTING AWAY OF BRICKWORK.

Many influences combine to bring about the gradual destruction of brickwork, and these are for the most part atmospheric. In this country, says the British Clay-worker, we have not to contend with those sharp changes of temperature which are noticeable, for example, in South Africa and in many parts of America. There temperature changes are amongst the most important of the destructive agents. Great cold causes contraction and heat again produces expansion, and the alternate expansion and contraction which may go on from day to day in countries where the days are hot and the nights cold play havoc with bricks and tiles.

Equable temperatures do not have much effect upon brickyard goods even if they be high or low, so long as these temperatures are maintained for a consideable time: destruction chiefly takes place at the moment of change from high to low or vice versa. Very few goods are tough enough to resist sharp temperature changes over any great range. We have seen the effects of such changes in mountainous districts, where the native rock is continually undergoing a comminuting force which tends to convert it into small fragments; such fragments accumulate at the base of cliffs and rock-faces as "tailings."

Moisture is not very fatal to good brickwork unless it is followed by frost, and then the destruction is very great, for the water in each little pore becoming converted into ice expands and exerts a tremendous force, which shows in the cracking and scaling of the material. Everyone knows the expansive power of ice who has had the misfortune to suffer from burst water-pipes during the thaw which has followed a severe frost.

In towns and cities where many fires burn and the atmosphere is laden with the products of combustion, the degradation of brickwork may proceed very rapidly, especially if there is much lime in the composition of the goods. In some districts where great manufactures go on the atmosphere is continually acid, and this must exercise a "rotting" effect upon all building materials which are susceptible to contact with acid.

But the alkalies may also operate, and that very markedly, upon brickwork, given suitable conditions. It has been noticed by the writer, and by others, we doubt not, that the alkaline sulphates, e. g., potassium and sodium sulphates, very frequently form incrustations which have a strong action tending to deteriorate brickwork. Magnesium sulphate also is capable of acting in the same way. Sometimes these alkaline compounds which form destructive incrustations on brickwork can be traced to the presence of alkaline sulphides present in the original clay, and, again, they are sometimes due to the sulphur existing in the fuel used in firing the kilns.

It has been proposed by certain foreign architects who practice in districts where great trouble is experienced from the destruction of brickwork by alkaline incrustations, to lay down a maximum limit for the presence of such impurities in bricks, and to reject all goods which show an excess over this limit. The amount of sulphur di-oxides in a powdered sample brick is estimated, and a direct test for the influence of sulphates is also made, the bricks being treated in a vessel with a saturated solution of sodium sulphate by boiling for half an hour and then exposed to a current of air until an incrustation appears.

RAPID BRICKLAYING.

Particulars were recently given in these columns concerning a piece of rapid bricklaying performed under an American contractor on the Westinghouse Company's new factories at Manchester. The record there made seems to have excited feelings of emulation amongst British bricklayers. An object lesson that caused some interest was afforded recently at Minehead, when Mr. A. J. Spiller, builder, of Taunton, undertook to lay a thousand bricks, Mr. G. Babb, of Warwick House, being his assistant and carrying all the bricks and mortar to him. The pair set to work at six o'clock, and with one hour interval for breakfast, and about fifteen minutes for refreshment at eleven, finished their self-imposed task at a quarter-past two o'clock, Mr. Spiller desired to show what could be done by a skilled workman (though out of practice for very many years) and an unskilled labourer.

TO PREVENT THE FREEZING OF GAS-PIPES.

A simple but effective device for preventing the freezing of gas-pipes is described in the Illustrated Zeitung fur Blechindustrie, consisting merely in the insertion of a wider piece of pipe just where the conduit issues from the ground or wall. For a conduit of a diameter from $\frac{3}{8}$ to $\frac{1}{2}$ in., a length of from 20 centimetres to 30 centimetres of a pipe 1 in. in diameter suffices. The deposition of the water particles contained in the gas, which on leaving the works have a temperature of about 10 degrees C., naturally takes place just where the gas is subjected to the most abrupt change of temperature—i. e., on its issue from the ground. If the external temperature is sufficiently low, the deposited water immediately congeals, and clogs the conduit. As soon as the gas has acquired the temperature of the conduit, the deposition of water and congealing cease; and this is said to be the case a short distance beyond the first cooling point. Therefore there should be no congealing beyond the inserted wider piece, and this piece is wide enough to accomodate a thick ice-crust and to still leave a free passage for the gas.

EXCESSIVE LOADS ON SCAFFOLDING.

Although the British Home Office issued in Febuary last a lengthy memorandum on the causes of common accidents that occur in buildings in course of construction, as well as hints for their prevention, loss of life from mishaps of the kind are unhappily not yet unknown. Numerous suggestions are given as to position ot supports, etc., but the quality of the timber is left to the builder's own judgment.

It is assumed that the plant in use has been, both in point of quantity and quality (and the first is of equal importance with the second), fully sufficient. It is regrettable says the London Builders' Reporter, that often in actual practice there is a neglect of adequate provision. The truth of this was again exemplified at an inquest which was held a few days since at Cambridge. The accident occurred in the course of the construction of a new medical school at Downing College. The workmen had raised a large piece of stone (about 18 cwt.) to the top of the scaffold, some 35 feet high, and were rolling it along the planks when the stone crashed through and took six workmen with it. They were all more or less injured, and one of them expired the next day in hospital. The jury returned a verdict of "Accidental death," with this rider:—"That the material used for the purpose of the scaffold was not of sufficient strength, and that sufficient care was not taken by the scaffold-builder, the foreman and the foreman mason." The foolhardiness with which timber is laden in the construction of buildings does not do much credit to the knowledge of those who have charge of the execution of works.

VENTILATING DWELLINGS.

In summing up the various points on this subject in a paper recently presented before the British Institution of Heating and Ventilating Engineers, Mr. E.W. Mayner suggests that for natural ventilation to obtain the best results, we require the following arrangements:

1. Inlet and outlet ventilators of sufficient area constructed to meet general requirements.

2. Illumination by electricity, as this is the best light to use if we study our health.

3. As the nation generally likes to see a cheerful fire, we must call in hot water or other ventilating appliance to assist us in our work of supplementary warming and ventilation.

4. Every room should have its own ventilating shaft carried up almost as high as the chimney-top and have a regulating extract ventilator fixed therein, near the ceiling.

5. The fresh air must be obtained from the purest source available, and where the ducts are long, provision must be made for the efficient cleansing thereof.

6. That architects be asked to assist us in our attempt to lengthen and stimulate life, as the members of this profession have it in their power to construct the necessary air shafts and inlet ducts in all new buildings.

7. That bedrooms, wherein we spend one-third of our existence, need more ventilation than any other room.

8. That it is absolutely necessary to assist ventilation of all dwellings by opening windows and doors, and airing cupboards, and other receptacles for clothing as often as convenient, through currents of fresh air, from bottom to top of all the building being necessary.

A BRICK LAYING MACHINE.

Bricklayers, who have always regarded themselves as the one class of skilled workmen who need never fear the introduction of labor-saving machinery to replace them, will be interested in the announcement made by the State Department at Washington, that a bricklaying machine has at last been invented. United States Commercial Agent F.S. Johnson, of Stanbridge, Canada, reports a recent invention which consists of bricklaying by machinery, instead of by hand. He says: "The machine, worked by two men and a lad, will lay 400 to 600 bricks per hour. Door and window spaces cause only a slight delay. The machine is suited for all plain work, such as walls, sheds, mills, factories, rows of cottages, piers of bridges, etc. Considerable pressure is put on the bricks, and it is claimed that the work is more firmly done than by hand. The invention will do the work of six or seven skilled bricklayers, and it is believed that a machine adapted to build a factory covering 60 by 40 feet could be put on the market for $500. The apparatus can be readily worked after a fortnight's instruction."

ERRORS IN TENDERS.

Too many builders take a wrong view of the importance of a tender. They do not realise says the London Builders' Reporter that when one is accepted by the building owner or his representative, the architect, a contract is entered into which is as binding as any formal document drawn up by lawyers for the purpose. That is the view taken in the English Courts, but a judgment just given in the Scottish Courts is in the same direction. A builder in Hamilton, N.B., tendered to erect a lodging-house for a limited company for the sum of £1,333, and the offer was accepted. When the work was practically complete he discovered that in transcribing the document one item was made £152 less than it should have been. In the agreements something was said about measurement, and the builder imagined he would be paid at schedule rates. But the company took the view that if the amount had been increased by £152 plaintiff's tender would not have been accepted. They refused to pay more than the total amount mentioned in the tender. In the Sheriffs' Court judgment was given for the plaintiff, who was held to be entitled to receive payment for the deficiency as extra work at specified rates. In the higher court before Lord Justice-Clerk, Lords Young and Trayner, the decision of the Sheriffs' substitute was reversed, and it was held that the contract was for a lump sum, and plaintiff was not entitled to claim detailed prices. The case should therefore serve as a warning, for tenders are sometimes drawn out without realising the responsibilities which are involved in them.

COLOURS FOR RESISTING THE ACTION OF LIME.—The following is a list of colours that may be used upon new plaster work, for mixing with distempers, gesso and stucco work, without being attacked by the lime. For white: Zinc white, lithapone, Charlton white. For Blue: Ultramarine, lime blue, smalt, cobalt and permanent blue. For red: Vermilion, red oxide, Venetian red, Indian red and madder lakes. For yellow Lemon yellow, cadmium yellow, Naples yellow, yellow ochre, brown ochre, Indian yellow and raw sienna. For green: Emerald green, cobalt green, verdigris and oxide of chromium For brown: Burnt umber, Vandyke brown, Cologne earth, asphaltum and purple brown. For orange: Orange chrome, burnt sienna, cadmium orange and Mars orange. For black: Ivory black, blue-black and lamp-black.

CONCRETE BUILDINGS.

The Ingalls building, which is to be put up in Pittsburg, is to be 15 stories high, with retaining walls less than a foot in thickness with imbedded steel rods. A mass of concrete columns will support the floors, which will be of solid slabs of concrete, six inches thick. A saving of one foot to the floor will thus be made, which will amount to 15 feet in this building. The difficulty of securing structural steel on time has long disturbed and delayed building here and elsewhere. This condition caused architects all over the country to cast about for a material that would make buildings absolutely fireproof and at the same time avoid that phase of construction which, in case of fire, caused a warping of the structural skeleton work. That concrete has been used in many instances in low buildings with marked satisfaction has long been a matter of history, but whether concrete would stand the strain incident to tall buildings was a matter of speculation until a practical demonstration was made in many cities of Europe. It is asserted on the highest authority that by degrees steel work is being eliminated from European buildings. The architects say that the structure when completed will be the handsomest in the city, as the concrete walls will be faced externally with beautifully colored and enameled brick. The interior walls will, as soon as completed, be ready for the plaster. They claim that if the building is filled with inflammable matter and a fire ensues, burning will occasion but little loss to the structure proper. They predict that this style of construction must of necessity supersede all other kinds of fireproof construction.—Construction News.

EXPERIMENTS WITH MORTAR.

The State engineer of New York has issued a report in which he deals with the investigation as to the action of freezing water on cement mortar which he carried out in 1900 and 1901. As soon as the briquettes were made up one-half were put in the open air and allowed to freeze, and the other half were kept inside and under a damp cloth. Results were thus obtained giving the effect on mortar mixed with a salt solution and not frozen as well as that which was frozen. Care was taken that those briquettes which were placed outside were kept from the sun's rays. During the period of the exposure a record of the temperature was kept, and thus it became possible to note how many times the mortar became frozen and thawed. Tests were made with a mortar mixed with 20, 40 and 60 per cent. salt solutions, as well as with fresh water. The results already published seem to show that the final strength of a mortar not allowed to freeze is slightly less when mixed with a 20 per cent. brine than when fresh water is used, the difference in most cases becoming greater in proportion to the strength of the brine. With mortar allowed to freeze and thaw that mixed with the 20 per. cent. brine gave the best results for the one year test, the main exception being a 3:1 Rosendale mortar, which gave a uniformly stronger test with fresh water than with brine. Whether or not allowed to freeze, the specimens mixed with brine almost invariably gave value in the 7-day test greater than those mixed with fresh water. Recently published experiments of American engineers on the consolidation of mortar show: When dry mortar was mixed in proportion of 1 of cement to 1, 2, 3 and 4 of sand, with 15.5 to 17.4 lbs of water per cubic foot of mortar, the average consolidation under ramming for nine experiments was 5.4 per cent. When plastic mortar was experimented on, using 16.7 to 19 lbs. of water per cubic foot, the average consolidation was 4 per cent.

PAINTING A FLOOR.

Very frequently a painter may be asked to paint a floor, and in many cases is instructed as to the colour, and other little matters. In the case of the floor being one that is to be done with oil paint, and to have much wear, the painter should select such colouring substances of certain earthy matters only, because the use of white lead for such a purpose is an error that should be avoided.

Many will advocate the use of lead in painting floors because of its supreme density and body, under the mistaken idea that density adds to its wearing quality. As a matter of fact says the Decorators' and Painters' Magazine, no oil paint will stand less wear than white lead, or colours composed largely of white lead. It simply covers the surface, and is one of the best paints employed to protect woodwork—where there is no great wear.

Ochres make the best wearing paints, and they may be applied in several ways. They may be mixed with the oil and applied with a brush in the usual manner; or they may be applied when mixed with hot stale beer and glue water, and when dry two coats of oil may be laid on thinly with a good strong brush, and, if properly done, the work will be lasting and satisfactory.

Care must be taken that the floor is perfectly clean and dry before the colour is applied, and if the latter is mixed with oil, the floor should receive two coats, both of which should be well brushed in.

With new floors, certain stains may be applied, and give satisfactory results without any sizing. When water stains are used they can be allowed to thoroughly sink in, and should then be varnished.

BUILDING IN GREECE.

A communication to Stone from Mr. D. E. McGinley says: Roofing tiles are manufactured in immense numbers in Greece. In and near the cities and large villages, there is scarcely any other kind of roof in existence; but in the mountain villages some of the roofs are covered with flat stones, or slabs of stone.

Tiles are manufactured in or near every city or town of any size in the kingdom, suitable clay for the purpose being plentiful and widely distributed. The tiles are made by hand, the only machinery used being a simple and primitive "mixer," turned by a horse or mule, which mixes the clay in a pit in the ground.

Nineteen-twentieths of the tiles used are of the old shape, and there are two sizes. Each tile is four centimetres (1·5 inches) wider at one end than at the other. The two sizes are of the same length—45 centimetres (17·7 inches). The small size is eight centimetres (3·1 inches) wide at one end and 12 centimetres (4·7 inches) at the other. The large size is 12 centimetres (4·7 inches) wide at one end and 18 centimetres (4·05 inches) at the other. Sometimes the tiles are laid in mortar, but usually they are kept in place by their own weight.

RED LEAD AND LINSEED OIL.

By A. Vaillant.

A special event has led me to consider the reasons which in former days lead to the use of red lead, and lately of colcothar (improperly called minium of iron) for protecting iron from rusting. This protection of the metal from the effects of damp and acids has always been a subject of great interest for builders, but for all that I have found no trace of works showing any sign of that interest, and builders appear to me to have been content with the old traditions of the utility of red lead.

Our colleagues in the N. of France think that it is unnecessary to paint iron which is shut up in masonry and sheltered from the weather, but others think that it cannot be regarded as being protected from damp, even under those circumstances, and that it should therefore be always painted with red lead.

There is no process which gives complete security from the weather to ironwork exposed in the open air. If they are oil painted, the painting has to be renewed and renewed until all details are smothered. Enamel scales off. Browning only acts as a very temporary preservative. Horn used hot with oil is still the best, but I have been unable to obtain any information about this singular process.

It is said that red lead and linseed oil form, in marked contrast to colcothar, asphalt, or coal tar, a composition which adheres very tightly to iron and has no action on it. The red lead coat does not crack in drying or after drying. It does not blister or flake off. When the painting has to be renewed it is not necessary to remove the old colour, and the other applications have to be scraped off, so that the new coat of asphalt, &c., can be put on a clean metallic surface.

The qualities essential for a protective coating for iron are impermeability, adherence, and elasticity. It must respond without rupture to the expansion and contraction of the surface which it covers. The red lead coating being a bad conductor of heat lessens these variations, so less call is made than would otherwise be the case on its elasticity.

Red lead is applied to ships' bottoms in the following manner: The iron is first made clean with hydrochloric acid and the vigorous use of rotary wire brushes. It is then rinsed with water and rubbed dry. It is then painted with the red lead and oil, which is first made into a thick viscid paste, which will keep several days without hardening. Just before use this paste is thinned with oil till it can be conveniently applied with the brush. Twenty-two gallons of colour contain one hundredweight of linseed oil and 400 lbs. of red lead, and will cover 120 square yards for the first coat and 144 for the second.

The proper preparation of the surface to be protected is of the first importance, while the other essential is that the composition should be good. Now builders pay attention to neither of these points. They clean the iron perfunctorily, or, which is just as useful, they don't clean it at all, and they paint it with inferior qualities of red lead, often adulterated with ochre or even with brickdust. Such alteration will remain undissolved if the suspected pigment is boiled in a solution of sugar acidulated with nitric acid, which dissolves minium rapidly.

Iron forged at an engineer's and brought to a building is left about in all sorts of weathers, and as above stated is imperfectly cleaned or not cleaned at all, and then painted with inferior red lead. Besides, careless work leaves joints insufficiently protected by the paint, and as soon as rust gets hold in a joint, the work is as good as ruined; as much ironwork on out-door carpentry testifies.

Although it must have been evident from the beginning of the use of iron its tendency to rust was its great drawback, no success seems to have been achieved in its protection until the revival of oil painting by Van Eyck, and the discovery that linseed oil had the power of drying in the air and covering surfaces with an impermeable coating. At a time when every painter prepared his own colours and made all manner of experiments, it was quite natural that the increased drying power conferred on linseed oil should have been found out. No doubt the early attempts to prevent iron from rusting were confined to greasing it, and once the effect of lead on linseed oil had been observed it was not a great step to paint iron with red lead and oil. But so far as I know no systematic attempts have ever been made to establish clearly the conditions of painting iron with red lead and oil to compare its results with those of the anti-rust methods. Cloez did something towards it when he showed that the drying of oil was due to absorption of oxygen, and the influence of light, heat, and extent of surface on that absorption. There is very little oxidation of an oil by the air in the dark, and less with coloured light than with daylight, and less at low than at high temperatures. The special capacity of linseed oil in painting has thus been defined, but it is very doubtful whether that can be said of the bodies which are mixed with it, and which seem merely to give opacity and consistency.

It is unfortunate that the great difference in price among oils and the great difficulties in the way of recognizing them when mixed together are the cause of much adulteration. Chemists have long been trying to find out means of satisfactorily analyzing mixtures of oils, and it cannot yet be said that they have been entirely successful. The difficulty lies in the close similarity between the composition of different oils, and in the fact that tests which give a sharp reaction with a pure oil do not do so in mixtures containing it.

Hence the exaggerated demand for special siccatives. Some there are of these which can be of service when used with prudence and with reference to some particular object to be attained, but unless used in very small quantities they lessen the adhesion of the paint, and create a tendency in it to scale off, by making it less elastic and hence less conformable to the effects of changes of temperature upon the metal.

Insufficient cleaning of the surfaces to be painted, and the use of other applications than red lead and linseed oil, are probably between them responsible for most of the failures experienced in iron-painting. However that may be, there can be no doubt that red lead and linseed form a very suitable composition for protecting iron. Recent researches tend to show that an actual compound of linseed oil and a minium, a sort of lead-soap, resembling India rubber, is formed. These researches also controvert a curious objection which has been made to painting iron with red lead. It has been said that the painted iron suffers by reason of a

galvanic action being set up between the iron and the minium. It is singular that no one has ever advanced this objection to the painting of iron with white lead and linseed oil, an application which is exactly on all fours with the composition of red lead and linseed oil. The objectors to red lead and not to white lead also seem to have forgotten that the oil, especially when dry, is so bad a conductor the passage of any current seems absolutely impossible. At Bremen, an iron coated with red lead 18 years before was found to be absolutely insulated, so that it did not affect a galvanometer with tensions of 150 volts. In fact, the director of telegraphs at Hanover was led to suppose that even atmospheric tensions might be resisted by a mixture of red lead and linseed oil.

A paste of red lead and linseed oil is the only substance capable of closing hermetically joints subjected to great pressure from gases or water, and it is used in the manufacture of secondary batteries to protect metals from oxidation. The experiments of Hacketal have shown that a paste of linseed oil and red lead applied to vegetable fibre provides a solid insulating, weather-resisting envelope, capable of replacing gutta-percha for overhead wires. The resistance of the dry mass is more than 640,000 megohms per square inch. The tissue impregnated with linseed oil pasted with from four to five times its weight of red lead loses completely its hygroscopic properties and becomes an insulator equal to indiarubber. It is insensible to all change of weather.

Two threads of bronze, each one-twentieth of an inch in diameter, were exposed to chlorine gas for a month, one naked, the other painted with red lead and linseed oil. The latter was not in the least affected, and the other was eaten completely through.

The present agitation against the use of lead in any form, from its poisonous effects on the workmen using it, is taking a wrong form. The right course is not to prohibit the use of lead and its compounds, which have valuable properties probably impossible to secure with any substitutes, but to find out and adopt methods whereby they may be used without injuring the health of those who have to handle them. Such must exist, and up to the present, very little attempt has been made to find them.—L'Architecture.

CANADIAN BRICK MANUFACTURERS' LOSSES BY FROST.

The Clayworker states that the brick manufacturers of Ottawa, Canada, suffered a severe loss from frost recently. Nearly all of the yards had started the 1st of May, and thousands of brick were frozen. Alex. Graham, of Ottawa East, lost 150,000 brick, having started about a week before the others. The Ottawa Brick Manufacturing Co. was the next heaviest loser, 120,000 being destroyed. King & Mulligan lost 75,000 and Thomas O'Reilly 75,000. These three manufacturers have yards at Hog's Back. Odell Bros., at Ottawa East, were the safest, losing only 30,000. They began operations a little later. Ballantyne & Conn, of Billings' Bridge, lost 100,000 brick and had the water pipes and pump badly damaged by frost. There is a big demand for brick among builders and the first on the market would have claimed a high price.

HOW WAGES HAVE ADVANCED.

The New York Record and Guide prints the following table showing how wages have advanced in the building trades since 1860 :

VARIATION IN PRICES PER HOUR OF LABOR FROM 1860 TO 1902.

	1860.	*1869.	1879.	1902.	†Increase.
Bricklayers	$0.22	$0.34	$0.30	$0.60	76
Carpenters	.22	.34	.20	.50	47
Gas fitters	.27	.25	.30	.50	100
Hod carriers and other laborers	.17	.21	.17	.33	57
Marble cutters	.28	.32	.25	.55	71
Marble polisher	.15	.20	.17	.44	120
Masons	.18	.34	.30	.55	61
Painters	.22	.27	.25	.44	63
Plasterers	.22	.39	.30	.62	59
Plumbers	.22	.27	.30	.50	85
Roofers	.20	.32	.25	.50	56
Stone cutters	.28	.34	.30	.54	59
Average per cent. of increase					71

*Wages reduced to gold basis.
†Per cent. of increase from 1869 to 1902.

To this great increase in wages amounting in some trades to more than 100 per cent. must be added a reduction of 20 per cent. in the working day. It is estimated that labor represents about 40 per cent. of the present cost of building, and yet we have strikes in all the trades for higher pay. The result must be to restrict building enterprise.

ENGINEERING BRICKWORK.

We have recently been inspecting some fine specimens of engineering brickwork, in connection with bridge-building, says the British Clayworker. The particular wall, which we may describe as a type of several others on the same large contract, is about twenty feet in height, and about seven feet in thickness. This is how it was built : A foundation about eight feet in depth of good concrete was first put in ; upon this the wall rose. The outside vertical faces were faced with brindles, and the interior filled up with common red bricks. So far, so good. But the thickness of the reds was a little less than that of the brindles. Consequently, in the absence of sufficient infilling concrete, there will always be internal strains and stresses of no ordinary character as long as the wall lasts. If these cirumstances do not lead to the facing bricks being cracked or forced outwards it will be a marvel. Again, there is considerable difficulty in preserving the regular courses of the bricks in this wall, owing to the fact that one-half of the wall has to be built before the other half, and the latter half has to be joined to the former. There would, of course, be no difficulty in joining the two halves together if the thickness of the red were the same as that of the brindles. As it is, the wall has to be much thicker than would be the case were the bonding perfectly true. On the score of using more bricks than need be for building construction, the clayworker cannot complain ; but it is unfair to him to point out, as the engineer will probably do later on, that his bricks are not strong enough for general engineering purposes. Everybody knows that the co-efficient of expansion of steel is not the same as that of bricks—no matter of what kind. Engineers are so well aware of this fact that they have for years past allowed for the movement of the girders, as the latter are affected more rapidly by extremes of change in temperature than are bricks. When that movement is not compensated for in some way, the brickwork or stonework on which the girders are

placed occasionally shews signs of bulging, but more frequently becomes cracked. We, have, however, recently been examining some brick piers erected about fifty years ago, and upon which cast iron girders were placed to support a bridge at a later date, and we find that the iron has been the greater sufferer, the bricks being as sound as the day they were put up. The buckling of the iron near the points of contact was very noticeable.

A WARNING TO STRIKERS.

The Police Magistrate of Toronto has given a warning to persons engaging in a strike who attempt to intimidate non-union workers. Several of the striking employees of the Toronto Carpet Company were summoned before him charged with attempting to prevent non-union female operatives from working. These attempts consisted of hissing at them and following them while going to and from the factory to their homes. The magistrate found the defendants guilty and imposed light fines, at the same time warning strikers that such conduct would in future be punished most severely.

A PHOTOGRAPH BY LIGHTNING.

John Klinck a builder and contractor, of Toronto, shows upon his right wrist a black and blue mark, which he believes to be a photographic impression by lightning of a part of a dwelling on which he was working during a recent thunderstorm. A flash of lightning struck the house, tearing splinters from both sides and completely enveloping Mr. Klinck in its white light. His wrist afterwards felt sore, but he has since assured his friends that an examination of it revealed an impression of the very building in which he stood.

HOW TO DETERMINE THE VALUE OF CEMENT.

In valuing cement Richard K. Meads, the writer of a paper on "The Chemical Analysis of Portland Cements," read before the American Section of the International Association for Testing Materials, suggests that the chemical analysis conform to the following limits: Percentage of silica, 20 to 23; Alumina, 6 to 11. Percentage of lime less than 2.8 times the percentage of silica plus 1.1 times the percentage of alumina. Percentage of lime greater than 2.7 times (the percentage of silica—3) plus (the percentage of alumina—1) minus 1.7 times the percentage of sulphur trioxide. Percentage of magnesia less than 3½ or even 3. Percentage of sulphur tri-oxide less than 2 or even 1½. It should be borne in mind, however, says this author, that a change in our knowledge of how to make cement may narrow at any time these limits, more especially with regard to the minimum of lime and also of the silica, which is made unnecessarily high by contamination with the fuel ash.

South Africa, it is said, is poorly supplied with lime, building stone, and suitable clay for hard brick. Large quantities of Portland cement are imported, and used in making ordinary mortar for building and to make an imitation of cut stone.

The carpenters and joiners of Montreal are organizing with the purpose of securing an advance in wages from a minimum of 17 cents to 20 cents per hour. The number of carpenters in the city is estimated to be about 2,000. No action is likely to be taken this season, but next spring the employers should be prepared to pay increased wages or contend with a strike.

USEFUL HINTS.

Waterproof cement for fixing enamelled letters on glass or other surfaces may be made by dissolving 5 ounces of gelatine or strong glue in a little water, and then add 3 ounces of bichromate of potash and ½ ounce of alum. This cement, when dry, resists water at all temperatures, and should be kept securely corked. It may be used for a variety of purposes.

Contrasts of Colors.—As a guide to the decorator who may be uncertain as to his ability to properly contrast colors, the following is offered as a guide in his decorative work:—Black and warm brown; violet and pale green; violet and light rose; deep blue and golden brown; chocolate and bright blue; deep red and gray; maroon and warm green; deep blue and pink; chocolate and pea green.

The superficial area of floor space is found by taking the measurements of each room separately from wall to wall, squaring, and adding together. The walls are not taken account of. Measurement of a building "per square" for rough pricing is, however, obtained by taking the dimensions from out to out of the walls at the ground level, so as to include any projection of the plinth or other set-off. The cubical contents of a building are usually found by taking the dimensions from out to out of walls and from half the depth of footings to half-way up the roof.

Hanging Lincrusta Decorations.—The material should be trimmed with a knife and metal-edged straight-edge, and hung edge to edge. Guiding lines for trimming will be found on most of the designs. For raw material ordinary paste is sufficient, and for decorated material the addition of a little Venice turpentine will be found of great service. One length or panel at a time should be pasted and hung, hanging lightly and working on the ground of the design only without brush or roller. An excellent plan is to paste a strip of muslin about two inches wide where the joint occurs, in order to prevent any after-opening of the joint.

A good incrustation cement is made with one hundard parts of quicklime, five of white or colored clay, and two of yellow ochre; it forms a cement which is tenacious, and remains unchangeable when exposed to the weather. The process of its manufacture is thus: The lime must be first slaked with a small quantity of water, more of which must afterwards be added till of the consistence of cream. White clay is at the same time mixed to a similar condition, and after remaining some time apart, the two solutions are carefully mixed together. During the continuance of this mixture in a tub for twenty-four hours, it should be frequently stirred, and a portion of yellow ochre added to give it an agreeable color. Walls covered with this cement have remained exposed to the weather for years, without injury.

To make paint hold on brick walls that show efflorescence, it is necessary to first remove this white powder, usually termed saltpeter, by washing with a mixture of muriatic acid and water, equal parts, and at the same time scraping off all the loose paint. When this has been done, sponge well with clear water and let the brick dry thoroughly before painting. The painting should be done after a spell of dry weather. It is a difficult matter to cure such walls entirely, but when the salts have been neutralized by the means referred to and a few coats of good oil paint applied, allowing each coat to dry hard before applying another, further exudation of soluble salts will scarcely make themselves apparent.

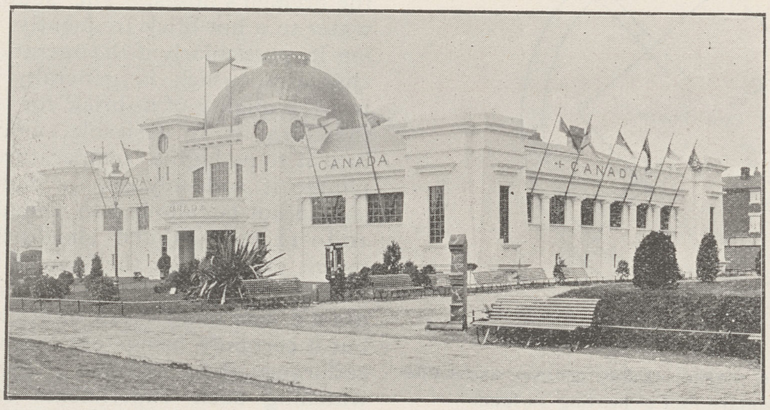
A Method for Prevention of Draughts.—Mr. Edward A. Harman, M. Inst. C. E., Huddersfield, Eng., writing with reference to the vexed question of draught prevention, says: "In workshops, mess-rooms, bath-rooms, mills, and large factories, the doors into the separate rooms frequently admit a furious draught. Various draught preventers patent and otherwise, have been tried, but perhaps one of the simplest extant is that of a roller, about 2 in. or 2½ in. diameter, of the width of the door, attached to the inside of it by means of a pair of lugs having vertical slots in them, instead of a circular hole, the small axle of the rollers thereby being allowed to slide freely up and down in the slot, and thus allow for any irregularities in the floor. The contrivance is a very simple one, and is capable of being adapted to the doors of outer kitchens, lobbies, sheds, etc., with a considerable reduction in the draught space available. It is really like a towel roller placed on the floor. Care should be taken in fixing it that the lugs permit of the rollers being practically close to the door when fixed, and that they rest upon the floor. I have tried the above arrangement for some years with considerable success and comfort. In some cases the roller may be threaded in several pieces about 3 in. in length on an axle. Manifestly the small reels work more freely than a long one. Though only a trifling detail, yet details are of importance."

VOLUME OF WATER IN HOT-WATER HEATING APPARATUS.

The volume of water required per square foot of radiating and heating surface, in the radiators, mains and heater of a hot-water heating apparatus, for best results in heating and greatest economy of fuel in operation, is a question which has received some attention in the past, but judging from the differences of opinion, as expressed in their various constructions, by manufacturers of heaters which have been used for heating by hot water during the past twenty-five years, and which are being offered and used at present for that purpose, we are still far from a standard, particularly in the volume of water required in the heater per square foot of heating surface exposed to the fire or heated gases.

In the manufacture of radiators, particularly when they have been constructed with a view to their being used for hot-water heating, the standard aimed at, and finally accepted by the leading manufacturers of radiators in this country, has been one pint of water to the square foot of surface—being approximately the volume of water contained in one square foot of surface of one-inch, ordinary thickness, wrought-iron or steel pipe.

Some radiators have been constructed which contained less than this volume of water, and some which contained considerable more, but in either case these radiators have gradually gone out of use, while new designs in hot-water radiators which have been brought out during the past six years, have largely conformed to this standard, which seems in practice to be the best suited for this purpose for all classes of buildings, except, perhaps, all-glass constructions, in which I have found it to be an advantage (on account of the greater and quicker cooling effect in such constructions, and the variable temperatures at which the water in the system is sometimes maintained, on account of irregular firing, lack of fire-box capacity or lack of capacity in the heater, and on account of friction due to the long lines of piping usually employed in placing the required radiating surface in this class of building) to use a surface that contained from fifty to one hundred per cent. more water, although were a uniform temperature maintained in the water in the heater, and the same arrangement of radiating surface utilized that is at present used for the heating of other buildings with this system, with short circulations, and an ample arrangement of mains, it would not be necessary to increase the body of water in the radiating surface above one pint to the square foot of surface.



CANADIAN PAVILION, WOLVERHAMPTON EXHIBITION OF ARTS AND INDUSTRIES.

At our last annual meeting, during a topical discussion, when this question was under consideration, I mentioned an experiment or test made some years ago, in two green-houses of uniform construction, size 16x100 feet. Each house contained approximately 2,000 square feet of glass and had about 650 square feet of surface or running foot of 4-inch greenhouse pipe; each house was heated by a separate heater located in the same pit, with separate brick flues 8x12 inches, extending 20 feet above the ground. To these flues each heater was separately connected by 10-inch wrought-iron pipe; each had about 4 square feet of grate area and about 90 square feet of fire and flue surface (about half fire and half flue.) The radiating surface was arranged in the usual way for such constructions in 4-inch greenhouse pipe on each side of the house, below the benches, with one flow and two return pipes on each side, an open expansion tank at the extreme end of each line, and each side connected separately to the heater with 4-inch flow and return connection. In one house the 4-inch pipe was left regular and had an internal area of about 10 square inches, in the other house 2x2-inch oak strips were inserted in the center of the pipes, reducing the waterway about 40 per cent., while retaining the same external surface. In a six-hour test maintaining a 60-degree temperature in each house with an outside temperature of from 25 to 30 degrees, an average temperature of 160 degrees was maintained in the flow mains and 130 degrees in the return mains at each heater. The consumption of fuel was 130 pounds of anthracite coal, stove size, for the house with full waterways in the radiating surface, and 110 pounds of the same coal for the house with reduced waterways, while the temperature on the flow main on the heater with reduced waterways was frequently 5 degrees higher than on the other heater, and the dampers on this heater had to be partially closed to prevent a higher temperature. Later this house was lengthened 25 feet, or 25 per cent., and piped in the same way, and the temperature maintained with the same average consumption of fuel as that used in the other heater with 25 per cent. less surface and glass area.

Since that time I have used largely $1\frac{1}{4}$-inch pipe, with a little over one pint of water to the square foot of surface, in small conservatories; $1\frac{1}{2}$-inch pipe, with about $1\frac{1}{2}$ pints of water to a square foot of surface, in medium-sized conservatories, and a 2-inch pipe, with about one quart of water to the square foot of surface, in large conservatories and greenhouses in preference to 4-inch greenhouse pipe with about half a gallon of water to the square foot of surface. I have found that I obtained better and quicker results, a greater possible variation of temperature, and greater economy from the use of 2-inch pipe, with manifolds, than from any other size of pipe, either larger or smaller.

In arranging the mains of a hot-water heating apparatus the area of the main has to be determined from the number of square feet of radiating surface to be supplied and the nature of the surface, whether direct, direct indirect, or indirect radiation, and from the length of the main; also, whether the main is to be used as radiating surface or covered, so that no standard as to volume of water per square foot of surface supplied could be adopted in regard to the mains in a hot-water heating apparatus without being subject to considerable variation. At the same time I have found cases in hot-water heating where the area of the mains was from 25 to 50 per cent. larger than was necessary, and they could have been reduced with beneficial results, being made large to insure a uniform temperature in the main, which could have been obtained in a smaller main with a different arrangement of taking off branch connections.

The greatest difference of opinion as to the volume of water required per square foot of surface in hot-water heating seems to exist in the heater, or source of supply.

Beginning with boilers of the Cornish type, which are used in some sections for hot-water heating, they contain about three gallons of water per square foot of boiler surface; then the ordinary horizontal and vertical tubular boilers, arranged for hot-water, have about $1\frac{1}{2}$ gallons per square foot, a number of cast-iron one-piece and sectional heaters have about one gallon per square foot, some have three quarts and others half a gallon; then some heaters of this type, and water-tube heaters, contain from three pints to one pint per square foot, and in some heaters constructed of one-inch pipe, while the volume of water to the foot of surface is not materially reduced, the friction is increased by inserting a sheet of metal, as a circulating division, reducing the pipe to half its area. Now, if we do not consider the Cornish boilers, which are more largely used in other countries, and begin with the horizontal tubular boiler, which is largely used in this country, we have a variation in hot-water heaters of all the way from $1\frac{1}{2}$ gallons to 1 pint of water per square foot of surface, and while all of these different constructions, with their varying amounts of water, will accomplish certain results with more or less efficiency and economy, certainly some will produce better results than others, and on that account would be considered a proper standard; and while the arrangement and location of the surface relative to the fire and heated gases would make some difference as to the volume of water which

*Paper by Mr. M. Mackay read before the American Society of Heating and Ventilating Engineers.

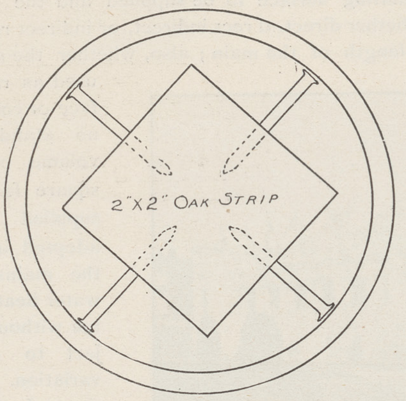
should be back of it, I have obtained the best results from an average of a half-gallon of water per square foot of heating surface in a hot-water heater, with an average of from 20 to 25 square feet of heater surface to each square foot of grate area, the surface being arranged with about 50 to 60 per cent. of fire surface and about 40 to 50 per cent. of flue surface.

DISCUSSION.

Prof. Carpenter: The paper is to be commended as bringing out a great deal of information about the relation of surface to volume, both in radiators and in boilers, and this ratio is an important factor in the successful operation of the radiator or boiler.

If the volume be too small within the boiler the circulation is likely to be bad, particles of steam are thrown out, and the results are poor. With too large a volume the action will be slow, and there will consequently be an excessive demand upon the apparatus.

C. B. Thomson: In manufacturing boilers we have to make one type answer for both steam and water, and we have to pay particular attention to the fact that it is a steam boiler. There are many little problems in a steam boiler, such as carrying a steady water line, carrying a water over into the radiators under certain conditions, and we have to be careful about the waterways and the return column, so as to get good circulation. On that account boilers are sometimes made to contain much more water than would be desirable in a water heater. I believe the



most popular heaters in the market to-day contain about one-half gallon of water to the square foot of heating surface.

If manufacturers built boilers for water alone, ignoring the conditions required for steam boilers, they would produce more efficient water boilers. A hot-water boiler requires small waterways and a large amount of effective heating surface exposed to the direct rays of the fire; also a rapid circulation of the water It is generally known, and I have made experiments which prove it, that with a sluggish circulation, sought to be accelerated by a strong draft, the draft carries away much of the value of the fuel. An easy and rapid circulation is therefore essential.

Mr. Mackay: I would like to enlarge on one subject a little On account of the sun greenhouses require little or no heat during the day time. With 4-inch pipe you must waste your heat to the outer air by opening ventilators during the day. With 2-inch pipe you can lower the temperature more quickly in the morning and avoid opening the ventilators and wasting the heat, and ye you can quickly raise the temperature to the desired point in the evening when it becomes cooler. At our last meeting something was said of the advantage of storing heat, but I think it better to generate heat as you require it and use it as you generate it.

Some people object to hot-water heat in dwellings because it takes too long to raise the temperature in the morning. I have not found it so in properly placed and properly operated apparatus.

The President: Do you use an open or closed heater?

Mr. Mackay: Always open. I can get better results with an open system, and I consider it dangerous and bad to use high pressure when you can do the work with low pressure.

Prof. Carpenter: The question as to volume and surface really comes down to a question of circulation. The smaller the volume on a given amount of work the greater must be the circulation, and it has been pretty well proved that the greater the circulation the greater the efficiency of the surfaces, both of the boiler and radiator. So it really comes down to what is the least practicable limit in velocity of circulation. Personally I favor a large volume of water in a hot-water heater for heating houses, as tending to reduce fluctuations of temperature. We like to put on a fire and have its effect distributed over a long time.

FIRE-PROOF BRICKS.

Theoretically, the ordinary types of bricks made by the clayworker are fire-proof; but, practically, very few of them are. We, of course, exclude perforated bricks in making this statement, says a writer in the British Clayworker. During a conflagration of any magnitude, the inside bricks, especially in partition walls, usually become red-hot. This leads to the expansion of each brick concerned, and buckling of the walls commonly results. This effect is minimized where the mortar has been laid on thickly between each brick-course, as the coefficient of expansion of ordinary builders' mortar is not the same as that of the bricks. In the last-mentioned case the mortar is, in the vast majority of instances, ruined by the great heat at an early stage of the conflagration, though if the wall is a thick one the mortar in the interior of the wall may to some extent be preserved. Cement mortar does not seem to be so much affected as ordinary lime mortar. Where the life of the mortar is sapped, so to speak, the bricks suffer more from the heat, but the greatest amount of damage is done to them by the water from the firemen's hoses. The sudden application of cold water to a hot brick frequently has the effect of cracking it, particularly if the operation be of an intermittent character, which is generally the case. In order to test the quality of a brick for fire-proofing purposes, therefore, it is desirable, amongst other things, to heat it to as high a temperature as possible, and then plunge it suddenly into a bucket of cold water. It should not be allowed to remain there more than say 10 to 12 seconds, and should then be returned to the retort, or whatever the form of furnace in which it was heated for the experiment. This procedure is rather drastic, and many types of bricks cannot withstand it; but it certainly brings out their relative capacity for endurance under extreme changes in temperature. In watching such experiments it will be noticed that whilst many different kinds of bricks crack and split right across, others will simply have a corner or two removed, and a third may merely exfoliate. In the last-mentioned instance the bricks are usually of very fair quality for the purpose. The sudden application of the water to the red-hot surface produces steam, which in its turn exercises a semi-explosive result at innumerable points on the surface. The accumulation of these points locally leads to "starring" and frequently to serious exfoliation.

It is difficult to lay down a law as to what should constitute an ideal brick for fire-proofing purposes, but it is clear that cæteris paribus one that does not become red-hot very quickly, and which does not expand much, should fall into the first rank. At the same time, the brick must be strong, especially for the construction of of buildings in which much ironwork is employed. For, whilst it is in itself being very severely tested during a conflagration, the brick has frequently to bear the brunt of an attack from the iron girders. These latter expand very much during a conflagration, and though when properly built up an allowance is made for this, they are apt to buckle and exert enormous strain on parts of the wall not designed for such contingencies.

Bricks that are not protected in any way by fire-proofing materials, and upon which reliance is solely placed, ought not to be of a soft character except for small buildings where there is no likelihood of a very high temperature arising during a fire. The reason we make this exception is that they are less liable to great expansion during the fire, though they must first have been thoroughly well burnt in the kiln. We exclude nearly all fire-bricks from these observations.

BAGSHAW V. JOHNSTON.—Action brought in the High Court of Justice at Toronto. Solicitor for defendant Siddall moved to dismiss the action as against the applicant on the ground that no relief can be obtained against him for the cause of action alleged against him in this proceeding to enforce a mechanic's lien. The defendant Johnston is the owner of the property on which plaintiff asserts a lien, and the defendant Siddall was the architect for the owner. This proceeding or action was begun by statement of claim under the Mechanics' Lien Act. The claim is to enforce the lien and also reform the contract between the plaintiff and defendant Johnston, and to set aside the defendant Siddall's certificate or for damages. Held, that defendant Siddall is not a necessary party to an action to realize a lien, for he is neither a contractor nor a wage earner, nor one who has supplied materials, nor is he an owner or encumbrancer. He is merely the architect for the work. If plaintiff wishes to proceed against him he is of course at liberty to do so, but he must not do so under the Mechanics' and Wage Earners' Lien Act, for no power is given to join such a claim under it. Order made striking out the name of defendant Siddall as a defendant, with costs to be paid by plaintiff. Leave to defendant Johnston to make any motion that he may be advised.

—THE—

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Discoloration of a newly plastered internal wall may be due to several causes, but we should hardly blame the bricks. It may be caused either by the composition of the backing or of the setting coat, by the floating having been brought up in one coat, or because there was insufficient thickness in the coats. Two or more of these may have united in discoloring the surface. The only remedy is to replaster, using good materials and in three coats—described as render, float and set.

LEGAL.

Our readers will be interested in the decision which the British Court of Appeal has given in the case of Warren v. Brown, which decides very important questions with regard to rights of light. It will now be the leading case on the question, and probably for very many years will regulate other decisions. The case arose at Leicester. The plaintiff complained that a new building had been erected on the other side of the street, and that it deprived his premises of the light which they had regularly received when the space was quite open. Mr. Justice Wright heard the case at assizes, gave himself much trouble, and presently visited the premises to obtain an accurate idea of what amount of inconvenience was sustained. He afterwards reserved judgment to hear a legal argument in London. He found that the premises undoubtedly could not now receive the same amount of light that they had previously received, and that substantial damage, which he estimated at £300, had been done, but at the same time he refused to give judgment for the plaintiff, as he thought abundance of light had been left the building for all ordinary purposes of residence or business, and he added these important words:—"Unless, indeed, there is some such limitation of the right to light for ancient windows, it is difficult, as Lord Hardwicke observed in Fishmongers' Company v. East India Company, to see how the ordinary extensions and improvements of towns could be carried on. If every house which has existed for 20 years is entitled to have all, or substantially all, the same light come to its windows as during the 20 years, no new houses could be built opposite to old ones, unless at a distance which would impose on servient tenements an unreasonable burden, and might involve grave public inconvenience." The plaintiff appealed against that decision. The argument was heard by the Court of Appeal, and Lord Justice Romer delivered the decision of the Court, the other members of which were the Lord Chief Justice and Lord Justice Vaughan Williams. They reversed the decision arrived at by Mr. Justice Wright, and practically said that if ancient lights are interferred with, and that if substantial and real damage ensues to tenant or owner, then the tenant or owner is entitled to relief. In so doing they refer to a quoted decision by Lord Justice Mellish, given many years ago, but which unfortunately seems often to have been forgotten. It was:—"I cannot think that it is possible for the law to say that there is a certain quantity of light which a man is entitled to, and which is sufficient for him, and that the question is whether he has been deprived of that quantity of light. It appears to me that it is utterly impossible to make any rule or adopt any measure of that kind. It is essentially a question of comparison—whether by reason of deprivation of light the house is substantially less comfortable than it was before."

The Arbhitect as Arbitrator.—The point at issue in a recent case before Justice Buckiner relating to a school at Brigton, Eng., was the extent of an architect's powers as arbitrator in a work which was carried out under his superintendence. In 1897 a contract was entered into by Messrs. Peters & Son with the Roedean School Site and Buildings, Ltd., for the erection of a school at Brighton which was to cost over $43,000. The work was to be completed by September 1, 1898. It was agreed that all disputes were to be referred to the architect, Mr. J. W. Simpson. As the work was not finished on that date, and the builders became bankrupts, notice was given for determining the contract, and the building was completed under the architect's direction on June 27, 1901. A final certificate was prepared, which testified that some hundreds of pounds were due Messrs. Peters. Their solicitors then informed the Roedean Company that they claimed damages for improperly determining the contract. The company requested the architect to arbitrate on any differences which were raised. On one side were a Mr. Davis, who possessed an interest in the contractors' business, and a Mr. Belcher, who had advanced money to the contractors, besides others who had also claims on the settlement. When, however, the arbitration was about to take place, Mr. Davis's solicitor served on the arbitrator an injunction restraining him from proceeding with the inquiry. Another protest came from Mr. Belcher. The proceedings were delayed, but eventually the inquiry was held and the award issued on April 9, 1902. On the 11th the company sought to enforce the award, and on the 14th a writ was issued on behalf of Mr. Belcher, in which it was stated that the company had illegally obtained possession of the site and determined the contract. The company were unsuccessful in attempting to stay the action or to enforce the award. The case was therefore brought before the Court of Appeal, the question being whether Mr. Belcher should be permitted to continue his action, as the matters in dispute had been determined by the arbitrator. On the other side, it was contended that the trustee for the contrators had a rightful claim to be paid quantum meruit for work and materials. As they were not allowed to complete the work under the contract, the contract itself was at an end, and the whole should be measured up. The master of the Rolls and the Lords Justices came to the conclusion that as all the parties had agreed to the architect's jurisdiction as arbitrator, they could not after the close of the proceedings say the award was bad or that the arbitrator had exceeded his powers; the award should be enforced by the company, and Mr. Belcher's action stayed. The position of the architect as arbitrator has been therefore once more upheld in a case which presented some novelties.

BUILDING REGULATIONS.

The loss of the lives of several firemen at a recent fire in a warehouse in Toronto has served the useful purpose of focusing public attention upon the necessity for proper inspection of buildings, and the adoption of building regulations suited to modern requirements. Nothing short of a disaster of this kind would apparently cause the city council to move in the matter. The Ontario Association of Architects and the Toronto Architectural Eighteen Club have jointly addressed a communication to the council as follows :

That the architects of the city, understanding that it is proposed to reorganize the City Commissioner's Department, believe that it it would be to the city's interest that a committee of architects should be consulted in reference to the appointment of a City Architect and the revision of the Building By-laws.

While the architects are of the opinion that it is exceedingly important that the very best man obtainable should be appointed as head of the building department, they think tdat for the designing and erection of the more important city structures better and more artistic results may be obtained by employing architects of known ability.

The architect or engineer in charge of the Building Department should be thoroughly competent to judge of the stability of the most complex structures, with ability to calculate strains and stresses, and with a thorough knowledge of all kinds of building materials and processes.

The chief concern of the architects, however, is the thorough revision of the Building By-laws.

The Building By-laws Committee of the Toronto Chapter of the Ontario Association of Architects spent a large amount of time some seven years ago preparing a set of by-laws which were then presented to the Property Committee, and which, after one or two meetings for their consideration, were quickly shelved.

About eighteen months since, the Toronto Architectural Eighteen Club also entered into correspondence with the Property Committee regarding the revision of the Building By-laws, after having obtained information regarding Building by-laws from some six or eight American cities, and with no more tangible results.

It has been for many years a fact patent to all interested in building operations, that the Building By-laws are entirely behind the times and out of date, while some of the most usual and modern methods of construction are not even hinted at.

Among the latter may be mentioned steel cage construction, fireproofing in various forms, and cement mortar in substitution of lime mortar, giving stronger walls with less thickness.

Many abuses have crept in through the by-law permitting flimsy additions to buildings by means of so-called mansard roofs, which are practically wooden buildings, having a slope of but a few inches from the perpendicular, while they are just as inflammable as any other wooden building.

Some of our largest buildings in the first-class fire limit are thus topped-out, and the license to use such a hazardous method of building is a menace not only to adjoining property, but the city at large.

An ordinance should be framed regulating the frontage line of buildings, especially in residential districts. There is scarcely a residential street in the city which is not marred, and the value of property adversely affected by the non-observance of a common frontage line.

An ordinance should also be framed to protect the owners of residential property from the incursion of shops and business places. The value of whole sections has been seriously reduced, and the character of the neighborhood changed or lowered by the facility with which a shop may be introdnced into a first-class residential block, and without any corresponding advantage to the residents.

There are many other matters which should receive immediate and careful consideration, if our city is to be kept abreast of the times. To accomplish these objects, we would respectfully suggest that your Board accept the offer of a committee to assist in putting the by-laws in satisfactory shape."

The Toronto Board of Trade has appointed a committee of its members to look into the matter of the building by-laws with a view to assisting in bringing about their much needed revision.

It is to be hoped that before the recollection of the recent disaster shall have faded from public memory, public sentiment will compel the Council to deal in a definite way with this important subject.

A JAPANESE EXHIBITION.

In pursuance of the policy pursued during the last decade, of investigating and learning as much as possible of Western business methods, Japan is making arrangements to hold a World's Exhibition in Osaka, her principal city. The Canadian government is arranging for an exhibit of the native and manufactured products of this country. As the required space for an adequate exhibit is not available in the Japanese buildings, a Canadian building will probably be erected. If this is done, the building should be so designed as in itself to form an attractive and valuable exhibit of Canadian building materials for some of which, no doubt a market could be found in Japan. The country has a population of about 40,000,000 of wide-awake people who are fast adopting western customs and methods and who for some years at least will be buyers of western goods.

According to the Irish Builder fire-proof partitions may be constructed of iron joists fixed vertically, filled in with silicate cotton or slag wood, or asbestos. A light partition can be made of angle iron or light iron joists covered on each side with wire netting plastered. It has been conclusively demonstrated by actual fire test that whereas the combination of either iron and concrete, or iron and terra-cotta, rapidly yielded to the influence of heat, silicate cotton and iron was, to all intents and purposes, fireproof, it having been found impossible to affect it in the slightest after being subjected to the extreme heat of a blast furnace for seven hours.

TECHNICAL EDUCATION.

It is quite natural that the Canadian Manufacturers' Association should be interested in trying to secure proper technical instruction for the artizan classes in this country. In reports on this subject presented to the Association recently, the Toronto Technical School as recently reorganized is declared to be on a satisfactory basis to impart the needed instruction, if supplied with adequate funds. The Board of Control of the City Council is censured for having reduced by $2000 the yearly appropriation for the school, thereby crippling its usefulness.

The council of arts and manufactures of the province of Quebec is commended for the work it is doing in Montreal, but the fact is emphasized that it also is hampered in its operation by lack of funds and the need of a suitable building. Comparison is made with a Philadelphia institution doing work of similar character, in which the annual outlay per pupil is $68.66, as against $2.55 per pupil in Montreal.

Fireproof floor are most desirable. They may be made of concrete or brick arches between iron girders, in which case there is no space between the flooring of one room and the ceiling of the room below. When timber is used it should be dry and well seasoned with sound boarding, to ensure separation between the rooms and to prevent either water leaking from the floor to the ceiling below or air passing from the room below to the above. Good flooring evidently serves to protect the ceilings of the rooms below. When there is space between the flooring and the ceiling and still more especially where a wooden flooring is placed over a concrete or other foundation laid on the ground, it is necessary to provide for ventilation of the space below the flooring. This is usually done by placing a perforated iron grating, instead of a brick, here and there in the outer walls, so that air can pass freely in or out below the floors. For this purpose bricks with conical holes through them would no doubt be found very useful.

PERSONAL

Mr. Richard Dinnis, a veteran contractor of Toronto, has recently returned from a trip to California, British Columbia and the Canadian Northwest.

Messrs. Burke & Horwood, architects, have removed their offices back to the Union Loan Buildings, Toronto Street, Toronto, which has been refitted since the fire which seriously damaged the interior a few months ago.

Mr. D. B. Dick, architect, who left Toronto for Europe a few months ago in search of health, is at present in Ireland, after having spent some time on the continent. His Canadian friends will be pleased to learn that his health is steadily improving.

Mr. Fred B. Gullett, a well known architectural sculptor, of Toronto, died at sea on July 6th, while returning from a visit to England, in search of health. Mr. Gullett, who was in his 61st year, was a native of Devonshire, England. In conjunction with two sons, he conducted a marble business in Toronto.

A cargo of about 15,000 barrels of Antwerp cement has been ordered for the substructure of the Fraser river bridge at New Westminster, B. C. The cement is valued between $40,000 and $45,000.

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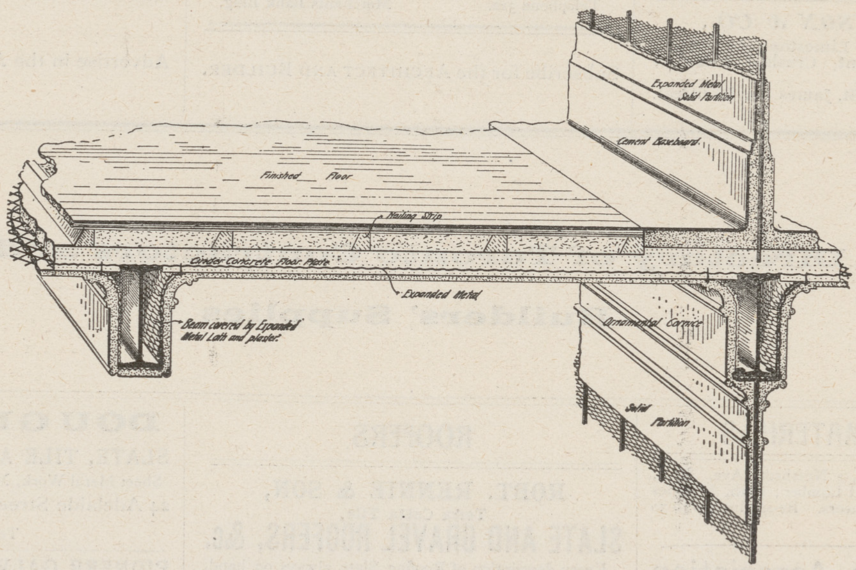

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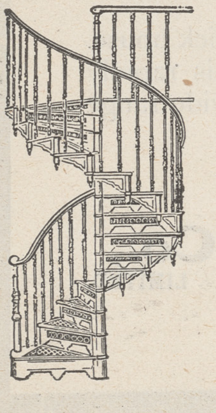

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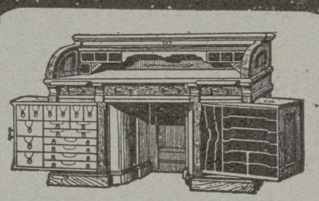

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